
*VIKING GLORY*. SOURCE: VIKING LINE

# RO-RO'S AND FERRIES

## THE BALTIC CRUISE FERRY REINVENTED

Nine years after the introduction of the game-changing *Viking Grace*, the then world's largest dual fuel ferry powered by LNG, Viking Line surprises the world once again with its somewhat larger and different 'cousin' *Viking Glory*. Built by China's Xiamen Shipbuilding Industry, *Viking Glory* is equally LNG-powered and comes with all the bells and whistles to further reduce the fuel bill and the emissions footprint. Besides its green credentials, this truly unique cruise ferry sets new standards in ferry travel between Sweden and Finland

By **Philippe Holthof**, Correspondent

Cruise ferries are a typical Baltic phenomenon, characterised by the fact that a large number of passengers don't take the ferry to travel from A to B. The ferry itself has become the destination, largely on account of the duty-free status of the Åland Islands which these ferries crisscross.

The €194 million *Viking Glory* joined *Viking Grace* on the 160-nautical-mile Stockholm-Åland-Turku route in early March (the intermediate call at Åland sees the ferries dock in Mariehamn, the islands' capital, during the day and Långnäs during the night). Sailing through the fairly well-protected Stockholm, Åland and Turku archipelagos for a good part of the sailing, this route is way shorter than the Stockholm-Mariehamn-Helsinki overnight service, allowing for the Stockholm-Åland-Turku ferries to make a 24-hour roundtrip.

Notwithstanding the very tight 65 to 75-minute turnarounds at either end of each crossing, the Stockholm-Åland-Turku route is a well-oiled traffic machine. The 15-minute stop in Mariehamn is crucial with the ferries coming from opposite directions docking simultaneously. Strange as it may sound, it is paramount that the Stockholm-Turku ferries meet in Mariehamn as they offer connecting sailings. So-called picnic cruisers who board Viking Glory in Turku in the morning and Viking Grace in Stockholm swap ship in Mariehamn to sail back to their original port of embarkation for arrival in the evening. Upon arrival in Stockholm and Turku, an army of cleaning persons board the respective vessels to clean cabins and public spaces in just one hour!

### Building in China

*Viking Glory* replaced the 1988-built *Amorella*, now temporarily cascaded to the Stockholm-Mariehamn-Helsinki route. The first plans to replace *Amorella* were unfolded in 2015, just two years after the introduction of *Viking Grace*. Part of a Finnish-Swedish EU project aimed at further reducing particulates, SOx, NOx and

TWO OF THE SIX WÄRTSILÄ W10V31DF FOUR-STROKE ENGINES. SOURCE: PHILIPPE HOLTHOF

GHG emissions, the *Viking Glory* newbuilding project has been granted EU aid from the Connecting Europe Facility (CEF) programme for the NextGen Link joint EU project. Deltamarin has been instrumental in the concept design as well as assisting Viking Line with the tender and contract phases with an LoI signed in November 2016, followed by a conditional contract in April 2017.

While *Viking Grace* was built by STX Finland, now Meyer Turku, the builders of cruise ships and complex ro-pax ferries had full order books at the time when Viking Line's newbuilding project kicked off. Consequently, Meyer Turku – one of the 21 yards approached by Viking Line – quoted an unrealistically high price. There were long discussions with Brodosplit, builders of *Amorella* and sister ship *Isabella* (now Tallink's *Isabelle*) and Mitsubishi Shipbuilding, yet the latter shipbuilding conglomerate eventually didn't quote in the aftermath of the problems experienced with the construction of AIDA Cruises' *AIDAprima* and *AIDAperla*.

TWIN 295M3 TYPE C LNG TANKS ARE LOCATED AFT OF THE ACCOMMODATION. SOURCE: PHILIPPE HOLTHOF

Three Chinese yards were equally in the running, quoting similar prices. One of these was Guangzhou Shipyard International (GSI), the sole Chinese yard that had so far built ro-pax ferries for European interests. By virtue of being an LNG-powered cruise ferry with a high degree of complexity, not in the least from the outfitting of the public spaces, *Viking Glory* represented a first for Chinese shipbuilders. Xiamen Shipbuilding Industry (XSI) had not built any ro-pax or passenger vessels before and primarily won on price, yet at the time of the order it was already a prolific builder of PCTCs with Viking Line gaining positive feedback from Höegh Autoliners that had its New Horizon class PCTCs under construction at XSI, yet another Deltamarin design.

## Pods instead of shafts

Besides the concept design, Deltamarin was also in charge of *Viking Glory*'s basic and detail design. Following model testing at MARIN, the Netherlands, the decision was taken to add a ducktail and increase the engine power with six new-generation Wärtsilä W10V31DF medium-speed four-stroke engines powering the twin ABB XO 2100-type Azipods via six ABB synchronous AC generators of 5,780kVA each. A gas-electric solution was also favoured for *Viking Grace*, but back then Viking Line was hesitant to install pods and opted for a conventional shaft line and propeller.

With fuel efficiency at the heart of *Viking Glory*'s design, the choice for pods is a natural one as it offers a lower water resistance of about 8% when measured against a traditional shaft line propulsion system. Supplemented by three 2MW Wärtsilä bow thrusters, the pods, with a combined output of 11.2MW, guarantee unprecedented manoeuvrability, allowing to minimise manoeuvring time and extent the time at sea by reducing the service speed by 1knot, corresponding to a 2MW energy saving.


ONE OF CLIMEON'S HEAT RECOVERY UNITS. SOURCE: PHILIPPE HOLTHOF

Owing to the almost zero noise and vibrations levels, pods have become well-established on cruise ships, yet the flipside of the coin is that *Viking Glory*'s turnaround times are too short to perform maintenance of them. For this year alone, eight service days are scheduled with eight daylight sailings annulled. These service days are on Mondays outside the summer season, when passenger and freight demand is low. But with *Viking Glory* remaining tied up in port for maintenance, *Viking Grace* must also remain in port so as not to disrupt the sailing pattern.

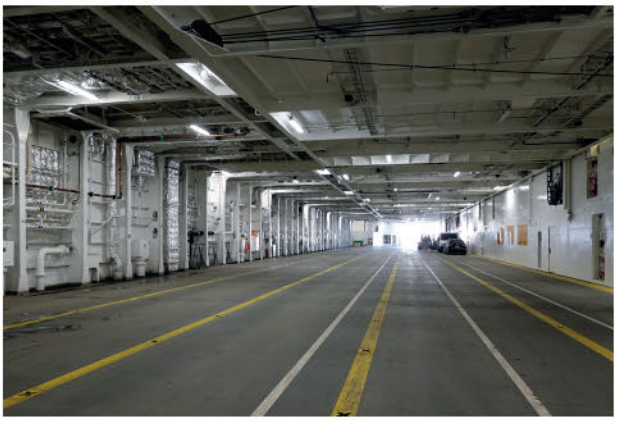
## Energy efficiency

When *Viking Grace* was ordered in late 2010, IMO's IGF Code for low-flashpoint fuels had not been published yet and as there were uncertainties as to the location of LNG tanks below deck, *Viking Line* opted to install the twin LNG tanks on deck, aft of the accommodation. On Viking Glory, the two Type C Wärtsilä tanks, with a capacity of 295m$^3$ each, are located closer to the engines, just forward of the ECR and aft of the ship's main preparation galley on Deck 2. Bunkering operations are in Stockholm. With a bunkering rate of 600m$^3$/hour and the cryogenic tanks having a combined capacity of 590m$^3$ at 90% filling level – more than sufficient for three consecutive days of operation – bunkering is accomplished within the limited turnaround time.

The general arrangement of decks 1 and 2 has been inspired from *Viking Grace* with a service corridor, starboard of the centreline on Deck 2, dissecting the respective compartments and connecting the large shop store aft with the food stores and preparation galley forward. In compliance with Safe Return to Port (SRtP) rules, the engine rooms are separated, each engine room holding three engines with a combined power of 5.5MW.

In 2015, Viking Line pioneered Climeon's Heat Power System on board of *Viking Grace*. Based on Organic Rankin Cycle (ORC) technology, the system harnesses waste heat from the engines to heat the vessel and generate clean electricity. This energy recycling system has also been adopted on *Viking Glory*, consisting of two 300kW heat power units. Going one step further, Climeon also developed a steam turbine solution, using waste heat from gases produced during the combustion process, thus maximising the energy recovery from the engines. The two steam turbines can generate a maximum of 150kW each and it is estimated that the heat power and steam turbine solutions will generate about 40% of all electricity required for passenger functions and reduce $CO_2$ emissions by at least 4,000tonnes per year.

In yet another industry first, a waste cold recovery system has been developed in collaboration with Wärtsilä, Projektia and Deltamarin. The waste cold from the use of LNG is recycled for refrigeration appliances, cold stores, catering equipment and HVAC technical spaces. Last but not least, the booking system interacts with the onboard air conditioning and lighting; a non-occupied cabin



MAIN VEHICLE DECK STARBOARD. SOURCE: PHILIPPE HOLTHOF

remains in power-saving mode throughout the voyage, further reducing energy consumption.

Following disappointing fuel saving results using Norsepower's Rotor Sail on *Viking Grace*, primarily blamed upon the wind direction on the Stockholm-Turku route, Viking Line decided not to install a pair of Flettner rotors on *Viking Glory*, resulting in a weight reduction.

## Vehicle and passenger decks

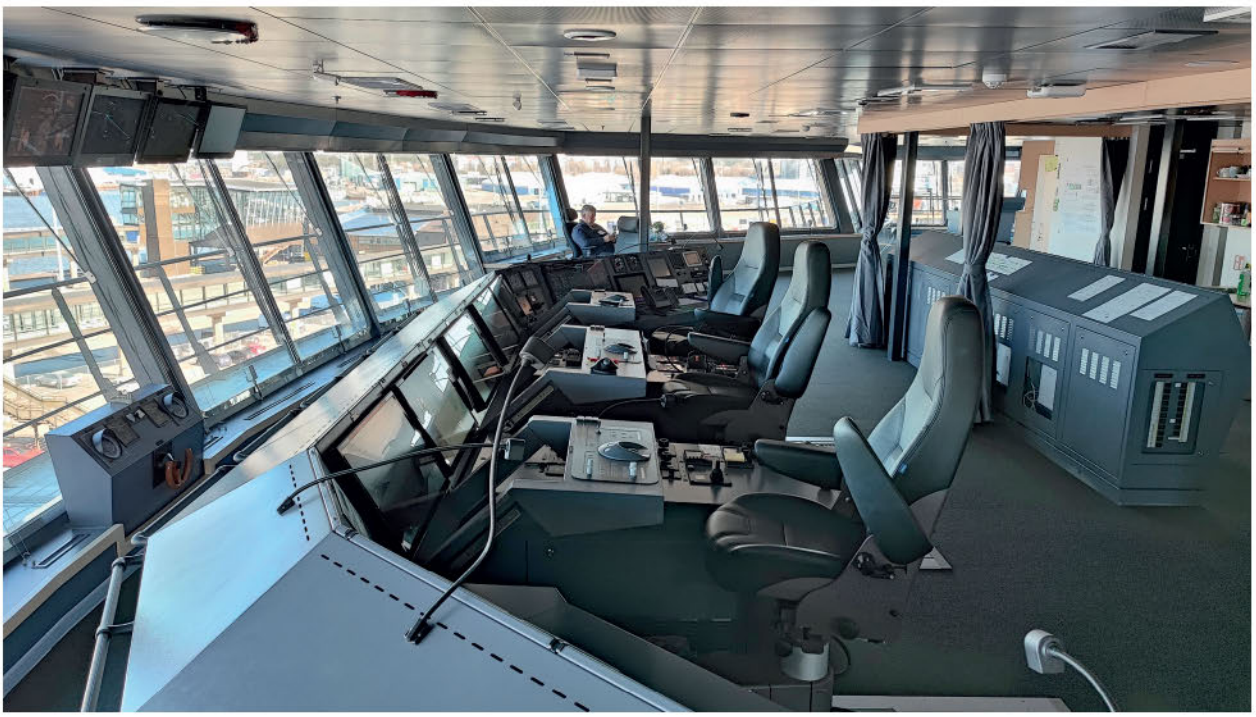
*Viking Glory* has a single freight deck with a total intake of 1,481lm, spread over nine lanes. This compares to 1,291lm and eight lanes on *Viking Grace*. A four-lane hoistable car deck, starboard of the centreline and casing, offers 514lm for cars with a clear height of 2.1m on and 2.4m below the lowered mezzanine deck.

Access to the main deck is via a single 7.5m-long (excluding flaps) stern ramp with a 15m-wide driveway. All access equipment, ramps and covers were manufactured by TTS, now part of MacGregor, with the 19.5m-long (excluding flaps) and 6m-wide bow ramp nested behind hydraulically operated two-section side-swinging bow doors. Up to 640lm of cars can be stowed on a separate car deck in the aft half of Deck 5. It is accessed through shell doors on both starboard and portside aft. For redundancy's sake, there is also a tilting ramp that connects Deck 5 with the hoistable car deck on Deck 4.

From a passenger perspective, it is in the accommodation where *Viking Glory* excels. Back in 2013, *Viking Grace* already represented a different approach to shipboard design with a departure from the general arrangement first adopted on Viking Line's *Mariella* in 1985 and subsequently repeated on many a Baltic ferry. With *Viking Glory*, Viking Line has further raised the bar. The general arrangement is a further evolution of *Viking Grace*'s with a stunning interior design from Stockholm-based Koncept, newcomers in the marine industry.

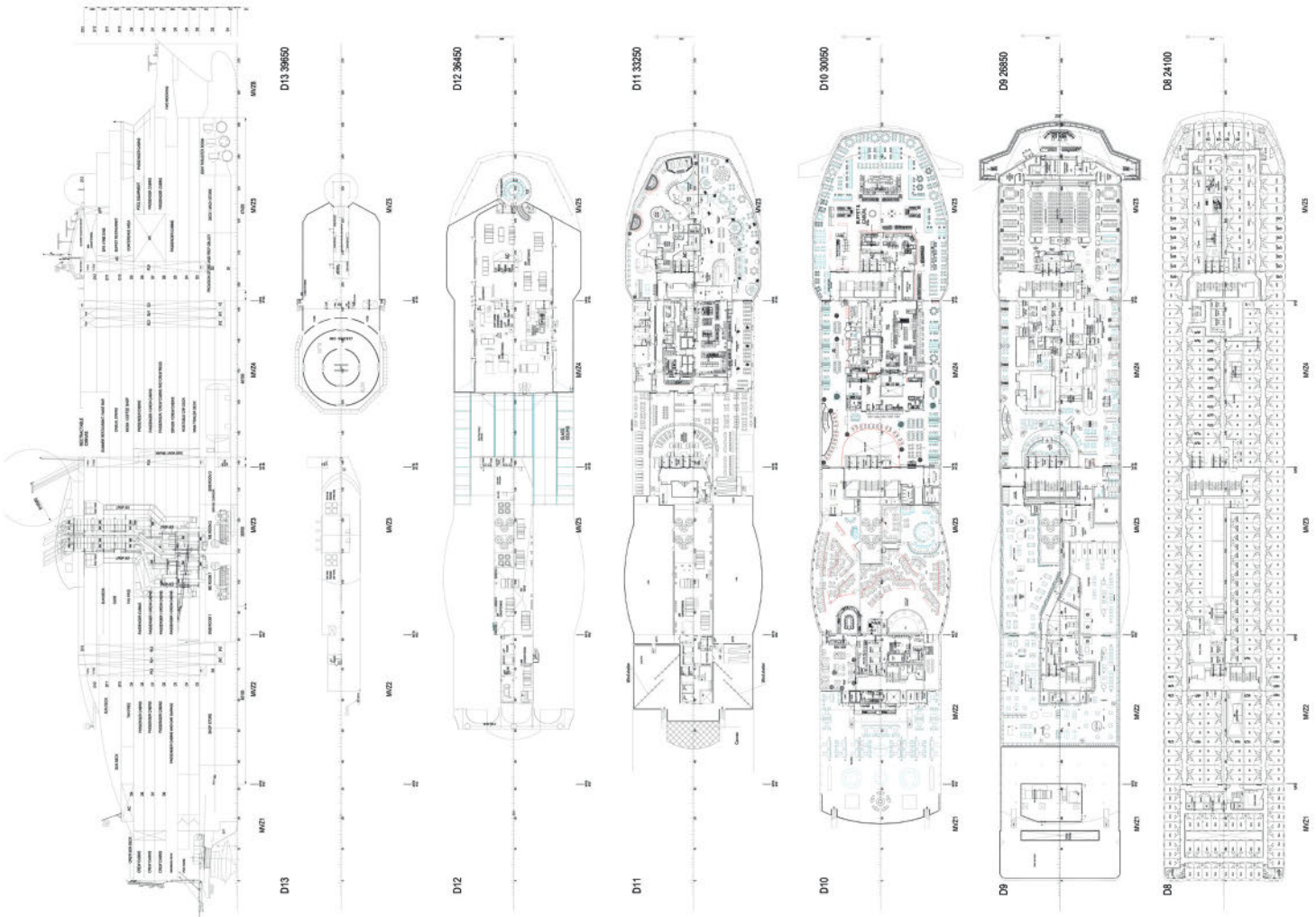
The 922 passenger cabins are spread over decks 5 to 8. Save for the captain and chief engineer, the crew is accommodated in individual cabins that are primarily located on decks 6 to 8 aft. As Finnish law requires outside cabins for all crew, a solution was found to let daylight in, in what would otherwise have been inside cabins, notably a three-deck-high athwartship trunk, dubbed 'Grand Canyon'.

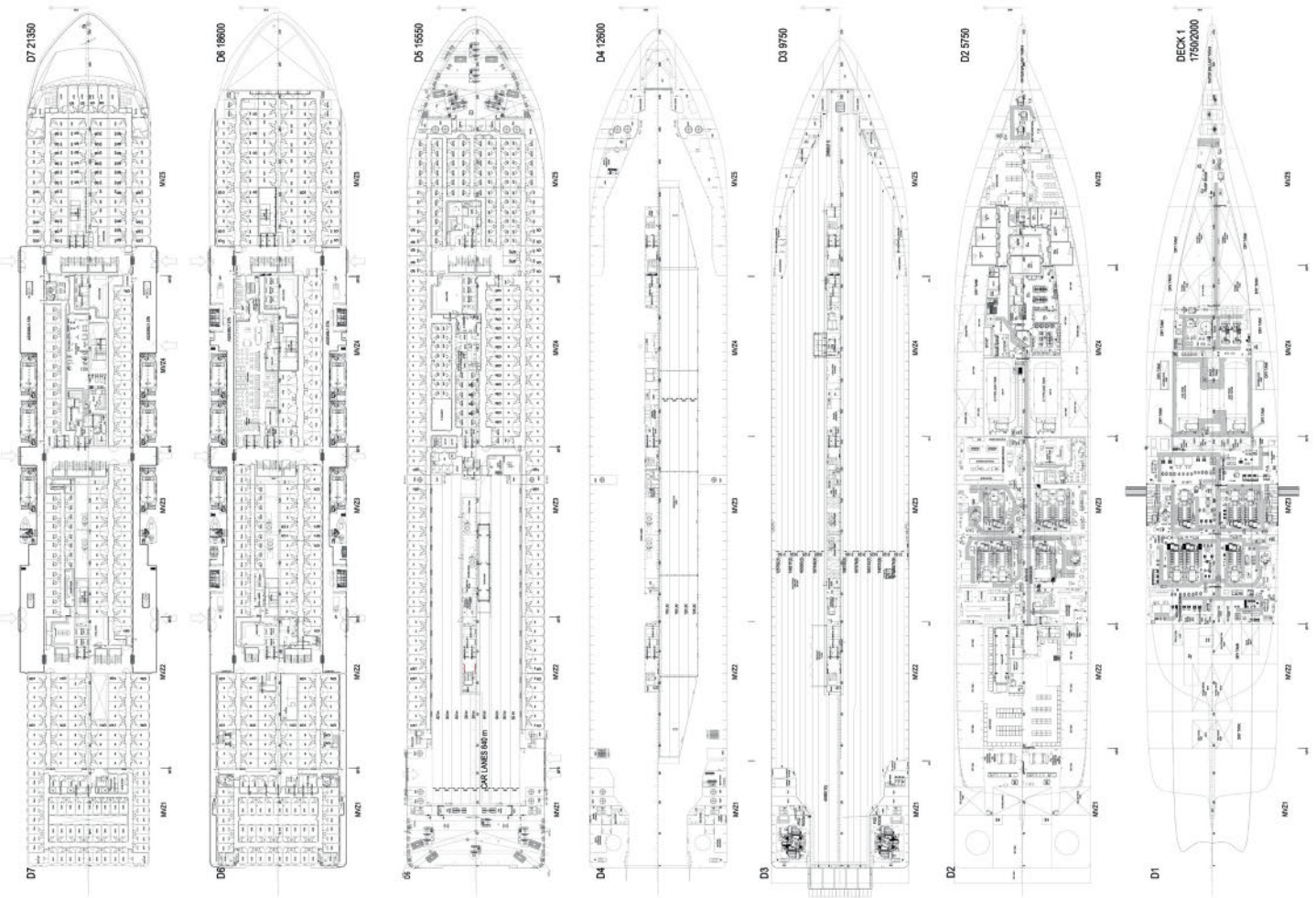
The public spaces are concentrated on decks 9 to 11. As passenger turnout can heavily fluctuate, a flexible layout of the public spaces is key with the possibility to create a lounge within a lounge to make for a more intimate feel in case of low occupancy. Three main staircases divide the public decks vertically. Passengers can equally move from one deck to the other using one of the nine KONE elevators, the permanent magnet synchronous motors of which consume up to 70% less energy than conventional elevator solutions.



*VIKING GLORY*'S BRIDGE, LOCATED ON DECK 9. SOURCE: PHILIPPE HOLTHOF

GENERAL ARRANGEMENT OF *VIKING GLORY*. SOURCE: DELTAMARIN




D7 21350
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DECK 12 FEATURES AN EXCLUSIVE REVOLVING DINING ROOM. SOURCE: PHILIPPE HOLTHOF

Deck 9, the bridge deck, holds a vast conference centre forward, the Torget piazza café with adjacent children's playrooms midships and the large, full-width duty-free shop aft. Torget comes with an atrium, being the ship's beating heart and functioning as kind of vibrant town square with a curved portside stairway leading to Deck 10 which holds Market, a food court with five different eating outlets. Forward on Deck 10 is The Buffet and to its portside the casual dining Mimmi's.

Aft of Market is Vista Room, the ship's main bar and lounge with a deck height equivalent to 1.5 decks. Uniquely, the public spaces have floor-to-ceiling windows throughout, but nothing beats the view from Vista Room. On busy sailings, a satellite bar behind glass screens is opened as is Algoth's, an intimate lounge-cum-bar just abaft Vista Room.

Kobba is the ship's à la carte restaurant with its own bar. Located starboard forward on Deck 11, its *pièce de resistance* is Fyren. Accessed via a curved stairway, Fyren is an exclusive separate restaurant on Deck 12, complete with a revolving private dining space for up to 12 persons. A spacious spa with gym and yoga rooms is located on the portside of Deck 11.

Yet another first, is the Viking Terrace. Well protected from the elements by windscreens and a retractable plexiglass roof, it offers al fresco dining but thanks to its outdoor-indoor function it can even be used on colder days using infrared heaters. There is extensive outer deck space on Deck 10 aft which has its own bar and comfortable patio furniture.

Altogether, *Viking Glory* is a truly unique vessel and a far cry from the 2006/9-built ro-pax cruise ferries competitor Silja Line operates on the Stockholm-Åland-Turku route. ■

| TECHNICAL PARTICULARS *VIKING GLORY* | |
|---|---|
| Length oa | 222.6m |
| Length,bp | 203.1m |
| Breadth, waterline | 33.7m |
| Breadth, max | 35.0m |
| Depth to main deck | 9.75m |
| Draught, design | 7.15m |
| Gross tonnage | 65,211 |
| Net tonnage | 42,626 |
| Deadweight | 8,087t |
| Lanemetres | 1,481lm on Deck 3 + 640lm cars on Deck 5 |
| Passengers | 3,000 |
| Passenger cabins/ berths | 922/2,934 |
| Engines | 6 x Wärtsilä W10V31DF |
| Power | 18,850kW |
| Maximum speed | 22.49knots |
| LSAs | 6 x 150-person VIKING Norsafe lifeboats + 6 Survitec Marin Ark 2 MES for 632 persons |
| Class | DNV |
| Class notation | +1A Ferry(A) BIS BWM(T) COAT-PSPC(B) COMF(V-1) E0 Gas fuelled Ice(1A*) LCS(DC) MCDK RP(3, 50%, +) |
| Flag | Finland |